19. Discuss the Huckel theory for ethylene and butadiene conjugated molecules.

20. Derive and discuss the Debye theory of heat capacities of solids.

APRIL/MAY 2025

GCH42/DCH42 -PHYSICAL CHEMISTRY-IV

Shanmuga Industries Arts & Science College T.V.Malai

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Give two examples for radiative and non-radiative processes related to photophysical processes.

2. Define phosphorescence.

3. What is an actinometer?

4. Distinguish between photovolatic cells and photogalvanic cells.

5. What do you mean by a rigid rotor?

6. Define Compton effect.

7. Write the approximation of perturbation method.

8. Mention the need for approximation methods.

9. Briefly point out Ke Einstein model for heat capacity of solids.

10. Define linear force and flux.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) State and explain Franck-Condon principle.

Or

(b) Explain the photophysical kinetics of unimolecular processes.

12. (a) Write notes on Chemical actinometers.

Or

(b) Discuss the solar energy conversion.

13. (a) Derive Schrodinger wave equation for hydrogen atom.

Or

(b) Solve the schrodinger wave equation for particle in a two dimensional box.

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14. (a) Give a brief account on Born Oppenheimer approximation.

Or

(b) Explain the valence bond theory for Hydrogen molecule.

15. (a) Explain the Einstein theory of heat capacity of solids.

Or

(b) Briefly mention the importance of Sackur-Tetrode equation.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Give the detailed account on excimer and exciplexes.

17. Explain in detail about the photosubstitution and photoredox reaction with suitable examples.

18. Discuss the solution of Schrodinger wave equation for a particle in a three dimensional box.